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10 CFR 50.73

ONS-2015-018

March 31, 2015

Attn: Document Control Desk
U. S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2746

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Oconee Nuclear Station Unit 3
Docket No. 50-287
Licensee Event Report 287/2015-001, Revision 0
Corrective Action Program No.: O-15-00909

Enclosed is Licensee Event Report (LER) 287/2015-001, Revision 0, for Oconee Nuclear Station (ONS), Unit 3, describing an event in which the unit was manually tripped on January 31, 2015, due to unacceptable flow oscillations from a Main Feedwater System control valve.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), "System Actuation."

There are no regulatory commitments contained in this LER.

If you have any questions regarding this this report, please contact Bob Meixell, ONS Regulatory Affairs Group, at (864) 873-3279.

Sincerely,

Scott L. Batson
Vice President
Oconee Nuclear Site

Enclosure

IE22
NRR

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INPO (Word File via E-mail)

NRC FORM 366 (02-2014) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 01/31/2017

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

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4. TITLE

Unit 3 Manual Reactor Trip Due to Unacceptable Main Feedwater Flow Control Valve Oscillations

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
1	31	2015	2015	- 001	- 00	03	31	2015	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
MODE 1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100%	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Robert C. Meixell, Regulatory Affairs Senior Nuclear Licensing Specialist	(864) 873-3279

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO ICES
B	SJ	3FDW EP 0007	F012	YES					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On January 31, 2015, Oconee Unit 3 was operating at 100% power in MODE 1 when Control Room operators observed that Main Feedwater flow indicators were oscillating outside of normal parameters. The Control Room supervisor made the decision to manually trip Unit 3 at 1431 hours due to erratic feedwater operation and increasing RCS pressure. A subsequent investigation determined the feedwater flow oscillations were caused by a subcomponent failure of the electrical to pneumatic converter (E/P), 3FDW EP 0007, to properly control feedwater flow for Main Feedwater Control Valve (MFCV) 3FDW-32.

This event was reported as a 4-hour notification to the NRC on January 31, 2015, in Event Notification (EN) number 50781 under 10 CFR 50.72(b)(2)(iv)(B) - Reactor Protection System (RPS) Actuation - Critical. The event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as an actuation of the RPS.

NARRATIVE

EVALUATION:

BACKGROUND

Main Feedwater Control Valve (MFCV) [EIIS: FCV] 3FDW-32 is a pneumatically operated valve, that regulates feedwater flow to the 3A steam generator when reactor power is between approximately 15% and 100%. (3FDW-41 is the corresponding MFCV for the 3B steam generator) The analog control signal for this valve is generated by the Integrated Control System (ICS) [EIIS: JA] and transformed to a pneumatic signal via an electrical to pneumatic converter (E/P) [EIIS: CNV]. Independent of the Main Feedwater control function, an Automatic Feedwater Isolation System (AFIS) circuit will automatically close the Feedwater control valves when a Main Steam Line Break (MSLB) is detected on the associated header.

Technical Specification (TS) 3.7.3 "Main Feedwater Control Valves (MFCVs), and Startup Feedwater Control Valves (SFCVs)" Limiting Condition for Operation (LCO) 3.7.3 requires "Two MFCVs and two SFCVs shall be OPERABLE," while in MODEs 1, 2 and 3, except when all MFCVs and SFCVs are closed and deactivated or isolated by a closed manual valve. The safety function associated with this TS is to isolate main feedwater to the steam generators upon a steam line break inside containment.

When the reactor trip was initiated, Oconee Nuclear Station (ONS) Units 1, 2 and 3, were operating in MODE 1 at approximately 100% power. No significant structures, systems or components were out of service such that they contributed to this event.

This event was reported as a 4-hour notification to the NRC on January 31, 2015, in Event Notification (EN) number 50781 under 10 CFR 50.72(b)(2)(iv)(B) - Reactor Protection System (RPS) Actuation - Critical. The event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as an actuation of the RPS.

EVENT DESCRIPTION

On January 31, 2015, Oconee Unit 3 (ONS-3) was operating at 100% power in MODE 1 when Control Room (CR) operators noticed that the ONS-3 Main Feedwater (MFW) flow indicators were oscillating beyond normal parameters. The CR supervisor made the decision to manually trip ONS-3 at 1431 hours due to the erratic MFW flow oscillations and increasing Reactor Coolant System (RCS) pressure. During plant response monitoring after the manual reactor trip, one main steam relief valve (MSRV) did not completely reseat, and a condensate booster pump mechanical seal leak was observed. Existing post-trip procedure guidance was used to reseat the MSRV by reducing main steam pressure. The MSRV seated within allowed procedural and safety analysis limits. The condensate booster pump was secured to stop the seal leakage. Other post trip conditions and system performance indications were normal.

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CAUSAL FACTORS

A preliminary cause investigation of the event determined that the feedwater flow oscillations were caused by a failure of the current to pneumatic converter (I/P) [a subcomponent of the electrical to pneumatic converter (E/P)] to properly control feedwater flow for Main Feedwater Control Valve (MFCV) 3FDW-32. The E/P (3FDW EP 0007) contains an electrical to current converter (E/I) and an I/P. The cause of the failure was a manufacturing defect within the I/P that resulted in intermittent malfunction of the E/P.

The condition that caused the failure of 3FDW-32 control function was determined to potentially apply to the MFCVs, SFCVs and other components on Oconee Units 1, 2 and 3 that use the same model E/P. The extent of condition is being reviewed and evaluated further in the final root cause evaluation.

The preliminary root cause evaluation concluded the following:

Root Cause:

An intermittent failure of the I/P (a subcomponent of the E/P) due to a manufacturing defect, resulted in failure to properly control feedwater flow for Main Feedwater Control Valve (MFCV) 3FDW-32.

Duke Energy's root cause evaluation for this event was not complete as of the date of submission of this LER. If the final root cause evaluation conclusions or corrective actions differ significantly than the preliminary results herein, then a supplement to this LER will be submitted.

The components of the E/P are not safety related; therefore, Part 21 reportability does not apply.

CORRECTIVE ACTIONS

Immediate:

1. Prior to restarting Unit 3, the E/P, the Positioner and Filter Regulators for the E/P were replaced on 3FDW-32, the E/P, and Filter Regulators for the E/P were replaced on 3FDW-41, and successful checks and calibrations were performed on 3FDW-32 and 3FDW-41.

Planned:

1. Replace the existing MFCV E/P converters on the other units.
2. Increase the replacement frequency for the E/P converters.
3. Modify the MFCV controls to provide a more fault tolerant design.

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SAFETY ANALYSIS

The ONS-3 trip on January 31, 2015, was uncomplicated and had no impact on public health and safety. Although oscillations in Main Feedwater (MFW) flow forced the unit offline, the system continued to provide flow to both steam generators and allowed operators to conduct a normal controlled shutdown. Following the reactor trip, 3FDW-32 closed fully and 3FDW-31 (Motor Operated Isolation Valve) also closed. Based on the fact that the Automatic Feedwater Isolation System (AFIS) function was maintained, Duke Energy concluded that the condition which affected the control function of 3FDW-32 did not challenge its Tech Spec function during this event. It was previously noted that there were minor perturbations with the reseating of one (1) Main Steam Relief Valve (MSRV) 3MS-3 and a small leak from a condensate booster pump but these were appropriately addressed. Additionally, no Emergency Core Cooling System (ECCS) actuations occurred. Consequently, due to the uneventful nature of the shutdown, the ONS-3 reactor trip did not result in a significant increase in risk to the public.

ADDITIONAL INFORMATION

A search of the Oconee Corrective Action Program (CAP) database was conducted for the preceding five (5) year period. Similarly, a review of industry Operating Experience (OE) databases was conducted using applicable keyword searches, i.e.,"feedwater oscillations," etc., to ascertain other reported events. This review revealed a similar Duke Energy event that occurred at ONS-3 on October 24, 2013, when the unit was manually tripped due to feedwater oscillations. This previous event was reported in LER 287/2013-01, Revision 0 (NRC ADAMS - ML 13358A336). Although the cause reevaluation of the prior event is ongoing (as part of the cause evaluation for this event), there appear to be similarities between the causes of both events.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX]. This event is considered INPO Consolidated Events System (ICES) Reportable. There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.